

REMARKS

Claims 18-35 are pending in the above-identified application. In the Office Action, claims 18-35 were rejected.

With this Amendment, claims 18, 26 and 27 were amended. Accordingly, claims 18-35 remain at issue.

In the Office Action, the Examiner also noted that the IDS submitted on 12/10/2007 is still objected to as set forth in a previous Office Action, which asserted that a number of pieces of information was missing with regards to certain of the references.

Applicants maintain that, to the extent that Applicants' representative was able to locate the requested additional information on those references, the information has been provided on the included IDS. Moreover, copies of each non-patent literature have been provided. Accordingly, the Examiner is respectfully requested to consider the cited references.

I. 35 U.S.C. § 103 Obviousness Rejection of Claims

Claims 18-35 were rejected under 35 U.S.C. § 103(a) as being purportedly unpatentable over *Hokari et al.* (US 2003/0168381) in view of *Wright et al.* (US 5,141,823).

Although Applicants do not agree with the Examiner's rejection, to further prosecution, Applicants have amended independent claims 1, 26 and 27 to further to clarify Applicants' claimed subject matter.

With respect to independent claim 18 as amended and referencing Fig. 1 for illustrative purposes, Applicants claim a system 50 for reforming diesel fuel into hydrogen. The system 50 includes, in relevant part, feeds 103 and 105 for water and diesel fuel, a supercritical water (SCW) reactor 201 in fluid communication with the water feed 103 and the diesel fuel 105, at least one pre-heater 107 in thermal communication with the water feed 103 and the diesel fuel

105, a water-gas shift (WGS) reactor 301, and a hydrogen capturing system 405. The at least one pre-heater 107 is configured to heat water from the water feed 103 and diesel fuel from the diesel fuel feed 105 to a predetermined temperature equal to or greater than the critical temperature of water. Water and diesel fuel are fed by the respective feeds 103 and 105 to the SCW reactor 201 at the predetermined temperature via the at least one pre-heater 107. The SCW reactor 201 is adapted to place the pre-heated water into a supercritical state within the SCW reactor 201. The SCW reactor 201 reforms the diesel fuel into a synthesis gas comprising a mixture of hydrogen and carbon monoxide and outputs the synthesis gas. The synthesis gas output by the SCW reactor 201 is fed into the WGS reactor 301 which converts the carbon monoxide of the synthesis gas into carbon dioxide and hydrogen and outputs an output gas including a higher percentage of hydrogen to carbon monoxide compared to the synthesis gas. The hydrogen in the output gas is captured by the hydrogen capturing system 405.

Applicants teach that, by preheating both the water and diesel fuel to a temperature equal to or greater than the critical temperature of water (e.g., 374° C), the SCW reactor 201 is able to operate more efficiently, producing hydrogen faster upon activation. See, Original Application, at pg. 11, line 20 to pg. 12, line 2.

Hokari discloses a reactor 5 that receives and mixing heavy oil, high temperature high pressure water, and an oxidizing agent, such as oxygen. See, *Hokari*, para. [0036]. “The reactor 5 permits reactions (shown in FIG. 7) to proceed so that vanadium in heavy oil is released from organic molecules” of the heavy oil. See, *Hokari*, para. [0037]. *Hokari* further discloses that these reactions may be achieved by supplying “previously heated and pressurized water” to the reactor 5. However, assuming *arguendo* that heavy oil may encompass diesel fuel, no where

does *Hokari* disclose or fairly suggest having at least one pre-heater to heat both the water and the heavy oil to a temperature equal to or greater than the predetermined temperature of the critical temperature of water.

Moreover, *Hokari* discloses that an oxidizing agent (i.e., oxygen) needs to be supplied to the mixture of heavy oil in order to produce the reaction needed to partially oxide the organic hydrocarbons of the heavy oil to generate the reformed light oil fuel containing released vanadium oxide. *See, Hokari*, para. [0037]. *Hokari* presumes that the removal of vanadium from the heavy oil may also involve the reaction of generating “hydrogen by shift reaction between CO and water,” where the hydrogen and remaining water are then involved in the reaction to release vanadium oxide from the heavy oil and “the cleavage [reaction] of organic molecule chains by the hydrogen and water.” *See, Hokari*, paras. [0031], [0037], Fig. 7. Although *Hokari* discloses that hydrogen may be temporarily produced from a shift reaction between CO and water during the reformation of the heavy oil, the produced hydrogen recombines with the organic molecules (i.e., carbon, oxygen and nitrogen) to form the reformed light oil fuel 11. Thus, *Hokari* fails to disclose or fairly suggest a SCW reactor that generates and outputs a synthesis gas comprising a mixture of hydrogen and carbon monoxide as required by claim 18.

Wright discloses an electrical generating plant that has a fuel cell that requires a supply of gaseous hydrogen and gaseous oxygen in order to generate an electrical output. *See, Wright*, Abstract. *Wright* further discloses a first supply means for supplying a hydrogen-containing compound (preferably methanol) that undergoes a two part endothermic reaction in a reformer to liberate gaseous hydrogen. However, *Wright* also fails to disclose or fairly suggest a system

having a SCW reactor and at least one pre-heater to heat both water and diesel oil to be supplied to the SCW reactor at a temperature equal to or greater than the predetermined temperature of the critical temperature of water. Moreover *Hokari* fails to disclose or fairly suggest a SCW reactor that generates and outputs a synthesis gas comprising a mixture of hydrogen and carbon monoxide as required by claim 18.

Accordingly, Applicants submit that *Hokari* and *Wright* (alone or in combination) fail to teach or suggest all of the limitations of claim 18, and respectfully request that the rejection of claim 18 be withdrawn.

Independent claims 26 and 27 as amended have water and fuel preheating and SCW reactor requirements (as well as other limitations) similar to claim 18. Thus, claims 26 and 27 should be deemed allowable for at least the same reasons as claim 18.

Claims 19-25 depend, directly or indirectly, from claim 18 and, thus, should be deemed allowable for at least the same reasons as provided for claim 18.

Claims 28-35 depend, directly or indirectly, from claim 27 and, thus, should be deemed allowable for at least the same reasons as provided for claim 27.

II. Conclusion

In view of the above amendments and remarks, Applicant submits that claims 18-35 are clearly allowable over the cited prior art, and respectfully requests early and favorable notification to that effect.

Respectfully submitted,

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